Development of Coupled Online and Hands-On Radiation Detection and Radiochemistry Laboratory Courses

Executive Summary

The goal of this project is to develop two courses: an online radiation detection and measurement laboratory and a hands-on radiochemistry laboratory. Funds awarded during Year 1 of this project were used to begin construction of the laboratory apparatus required to run the online radiation detection and measurement course. Funds in Year 2 will be used to finish design and construction of the lab equipment required for the online course and design experiments to be offered in the hands-on lab course.

The curriculum design and classroom instruction for both courses will be a collaborative effort between professors at Clemson University and South Carolina State University (SCSU). Based on educational backgrounds, current research and teaching interests, and previous experience with similar courses, the Clemson/SCSU team has the teaching competencies and subject matter expertise to successfully build and offer the proposed courses. The objective of the online radiation detection and measurement course is for the students to experience working with the instruments as if they were in the laboratory. The online laboratory exercises will be unique in that students will be able control laboratory measurements in real-time through a broadband Internet connection. The second course will be an intense hands-on radiochemistry laboratory which will build upon the knowledge students gained from the online course. The course will cover radiochemical separations processes that are “universal” in nuclear science fields such as environmental sampling, fuel processing, waste processing, and nuclear forensics. The course will be taught during the two-week “Maymester” term at Clemson. The short, intense laboratory course will provide a relatively low-cost alternative to obtaining hands-on radiochemistry experience.

These courses will improve the nuclear education infrastructure by being offered to universities that want to offer radiation detection and radiochemistry laboratory experience to their students but do not have the instrumentation, the radioactive materials license, or the personnel to teach the course. Furthermore, the online radiation detection course will offer an alternative to traditional online courses where students must travel to campus several weekends per semester for the detection laboratory experience. The short two-week timeframe for the hands-on radiochemistry course provides a reasonable balance between the required course time and the need for hands-on laboratory experience.

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